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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
WEST, JEFFREY R	

ART UNIT	PAPER NUMBER
2857	

DATE MAILED: 01/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/650,626	WILSON ET AL.	
	Examiner	Art Unit	
	Jeffrey R. West	2857	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 October 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,12,15,18,20-23,25,26,28,29,32-48 and 51-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *29 and 32-39* is/are allowed.

6)☒ Claim(s) *1-10,12,15,18,20-23,25,26,28,40-48 and 51-57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 August 2000* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 1 is objected to because of the following informalities:

In claim 1, line 8, "said plurality of digital that has" should be ---said plurality of digital channels that has---.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-10, 23, 26, 28, 48, 51, and 54-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,754,451 to Williams in view of Rockwell Software, "Getting Results with RSRules" (Rockwell).

Williams discloses a computerized machine control monitoring system, wherein a CMC uses a control program to control the operation of a machine through a plurality of digital channels, that define a substantially complete machine (column 2, lines 54-61 and column 3, lines 4-9), comprising a data acquisition component that is in communication with the CMC and acquires transition data about the digital channels, an analysis component that is in communication with the data acquisition component and performs analysis on

the acquired transition data to automatically determine if the machine has experienced a downtime event (column 3, lines 10-19) and, independent of the control program, develops a probability prioritized inventory of which channel likely caused the downtime event (column 5, lines 34-41), and a data storage component that is in communication with the data acquisition component to store the acquired transition data and establish a historical pattern of transition data (column 3, lines 35-43). Williams also discloses comparing the dynamic historical pattern of transition data, chosen from a pre-selected library of dynamic historical patterns (column 5, lines 49-61), to the current transition data, independent of the control program, to determine the operational status of the machine (column 3, lines 44-54 and column 5, lines 18-24).

Williams discloses that the remote/stand alone monitoring device (column 3, lines 20-22) comprises a display device (column 3, lines 22-25), in communication with the data storage component, that displays a cycle count of the repeatably cyclic transition data (column 2, lines 1-9), the prioritized channel inventory ("94" in Figure 5), and the overall operational status of the machine (column 1, lines 49-58).

Williams also discloses that the analysis component performs analysis on the acquired transition data to automatically, and without user-input, determine, store, and display, whether the machine has experienced a downtime event (i.e. a machine fault) (column 1, lines 16-20 and column 5, lines 33-40) as well as if one of the digital channels intermittently experiences

an unexpected transition absent a downtime event (column 5, lines 3-24) wherein the unexpected transition is characterized by a statistically significant deviation (column 5, lines 18-24)

Williams does not disclose, however, applying the diagnostic method for a plurality of virtual CMC machines that use different communication schemes to perform different functions defined by subsets of channels, including at least one channel designated to be ignored, and displaying the corresponding operational status, identifier, and runtime, of the plurality of machines substantially simultaneously.

Rockwell teaches a computerized machine control monitoring system comprising acquiring and storing data about a plurality of digital channels wherein the digital channels are grouped as virtual machines defined by subsets of channels (page 19, "Understanding I/O groupings" and page 20, lines 1-3). Rockwell Software also teaches displaying a reaction-time diagram with user defined names (i.e. identifiers) for each of the digital channel/virtual machine groups of run-time data indicating the time-on of a current transition and a time to off of a current transition (i.e. runtime from a pre-defined start) with respect to a tolerance level (i.e. indicating a status) based on historical transition data for each of the machines substantially simultaneously (page 4, Figure). Rockwell also teaches determining the overall performance of the machine performing several operations based upon global analysis wherein the individual channels are designated to be visible or not visible (i.e. ignored/excluded) in the overall analysis (page 20,

lines 16-27). Further, it is considered inherent that the control computers use different communication schemes because they control a variety of different machines (i.e. drilling and polishing) that would require different commands.

It would have been obvious to one having ordinary skill in the art to modify the invention of Williams to include applying the diagnostic method for a plurality of virtual CMC machines that use different communication schemes to perform different functions defined by subsets of channels, including at least one channel designated to be ignored, and displaying the corresponding operational status, identifier, and runtime, of the plurality of machines substantially simultaneously, as taught by Rockwell, because, as suggested by Rockwell, the combination would have provided specialized analysis of channels specific to a particular operation (page 19, "Understanding I/O groupings" and page 20, lines 1-3) thereby providing the user with more detailed information regarding the processing and performance of individual operations and further, by selectively ignoring/making not visible the output of particular channels for the global analysis of the entire machine, the combination would have provided the user with an option to link a plurality of operations together for an overall analysis or ignore individual aspects of a particular operation to provide specific user controlled analysis (page 20, lines 16-27).

Further, although Williams teaches establishing a priority based on probability but does not disclose that the priority is established according to a calculated probability percentage, it would have been obvious to one having

ordinary skill in the art to calculate the prioritized probability according to a percentage because percentages are the well-known method for expressing a probability.

Further still, since the invention of Williams teaches comparing current data to a an expected historical pattern and Rockwell teaches selectively ignoring channels of current data for overall analysis, the combination would have selectively ignored channels in the expected historical pattern as well because one having ordinary skill in the art would recognize that in order to successfully compare current data to a historical pattern to determine operational deviation, both the current data and the historical pattern must be based on the same amount of data/number of channels, otherwise a deviation would exist that is not caused by an operational anomaly but instead that is caused by a difference in the number of inputs.

3. Claims 12, 15, 18, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams in view of Rockwell and further in view of U.S. Patent No. 5,870,693 to Seng et al.

As noted above, the invention of Williams and Rockwell teaches many of the features of the claimed invention, including calculating a priority percentage based on a pre-selected historical reference data set (i.e. based upon the original and learned/historical states stored therein) (column 5, lines 34-41), but does not specify that when a downtime event occurs, priority is

established according to a time sequence of acquired data based on proximity to the occurrence of the downtime event.

Seng teaches an apparatus and method for diagnosis of abnormality in processing equipment comprising production equipment that executes a plurality of steps of a sequence under the control of a PLC (column 4, lines 27-31), a display device that provides information relative to a downtime event (column 4, lines 44-55), and a detecting means for determining the channel of data that likely caused the downtime event by analyzing the time sequenced proximity to the downtime event (column 9, lines 1-17 and 49-56).

It would have been obvious to one having ordinary skill in the art to modify the invention of Williams and Rockwell to include specifying that when a downtime even occurs, priority is established according to a time sequence of acquired data based on proximity to the occurrence of the downtime event, as taught by Seng, because, as suggested by Seng, the combination would have increased the production of the equipment by automatically diagnosing and determining the point of error in the machine using a logical sequential order rather than an expert system/analysis of the control program in the PLC therefore allowing abnormality detection by an average user (column 1, lines 42-48, column 2, lines 30-35 and column 11, lines 15-30).

4. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williams in view of Rockwell and Seng and further in view of U.S. Patent No. 5,949,676 to Elsley.

As noted above, Williams in combination with Rockwell and Seng teaches many features of the claimed invention including indicating an unexpected transition as characterized by a statistically significant deviation (Williams, column 5, lines 18-24) but does not teach specifying that the performed analysis comprise statistical standard deviation analysis and that a downtime event is defined by a statistically significant deviation in combination with an expired downtime timer.

Elsley teaches a method and system for diagnosing the behavior of a machine controlled by a discrete event control system comprising developing diagnostic rules based on discrete event timing patterns that occur during operation of the machine and evaluating the occurrence of the discrete events relative to the diagnostic rules to identify malfunctions in the behavior of the machine (column 2, lines 18-23). Elsley also teaches that the diagnostic rules are defined based on statistical analysis, such as standard deviation, of the repetitions of the machine timing pattern (column 2, lines 36-44) and that the occurrence of a downtime event is determined by a statistically significant deviation in combination with an expired downtime timer (column 9, line 60 to column 10, line 7)

It would have been obvious to one having ordinary skill in the art to modify the invention of Williams, Rockwell, and Seng to include specifying that the performed analysis comprise statistical standard deviation analysis, as taught by Elsley, because, as suggested by Elsley, the combination would have provided a statistical analysis detection method, that can automatically adapt

to changing operating conditions, which detects transient errors rather than only hard causal relationships (column 1, lines 25-32 and column 2, lines 4-15) and because standard deviation would have been a well-known method for measuring the deviation of Williams. Further, it would have been obvious to one having ordinary skill in the art to modify the invention of Williams, Rockwell, and Seng to include indicating a downtime event based on an expired downtime timer because the combination would have provided a method for eliminating false alarms by indicating downtime only when a serious fault stops the operation of the machine rather when there is an occurrence of a non-detrimental fault caused by periodic deviation.

5. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williams in view of Rockwell and further in view of U.S. Patent No. 5,949,676 to Elsley.

As noted above, the invention of Williams and Rockwell teaches many features of the claimed invention including indicating an unexpected transition as characterized by a statistically significant deviation (Williams, column 5, lines 18-24) but does not teach specifying that the performed analysis comprise statistical standard deviation analysis.

Elsley teaches a method and system for diagnosing the behavior of a machine controlled by a discrete event control system comprising developing diagnostic rules based on discrete event timing patterns that occur during operation of the machine and evaluating the occurrence of the discrete events

relative to the diagnostic rules to identify malfunctions in the behavior of the machine (column 2, lines 18-23). Elsley also teaches that the diagnostic rules are defined based on statistical analysis, such as standard deviation, of the repetitions of the machine timing pattern (column 2, lines 36-44) and that the occurrence of a downtime event is determined by a statistically significant deviation in combination with an expired downtime timer (column 9, line 60 to column 10, line 7).

It would have been obvious to one having ordinary skill in the art to modify the invention of Williams and Rockwell to include specifying that the performed analysis comprise statistical standard deviation analysis, as taught by Elsley, because, as suggested by Elsley, the combination would have provided a statistical analysis detection method, that can automatically adapt to changing operating conditions, which detects transient errors rather than only hard causal relationships (column 1, lines 25-32 and column 2, lines 4-15) and because standard deviation would have been a well-known method for measuring the deviation of Williams.

6. Claims 40-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams in view of Rockwell and further in view of U.S. Patent No. 5,586,156 to Gaubatz.

As noted above, the invention of Williams and Rockwell teaches many features of the claimed invention including obtaining predetermined limits of the cycle count, as well as the library of historical transition data, based on

configurations in the hardware and software set by the manufacture (Williams, column 4, lines 22-24 and column 5, lines 49-54) as well as specifying that the historical pattern of transition data is obtained from a pre-determined reference data set that is repeatably cyclic, comprises at least one cycle of data, and defines a virtual machine. The invention of Williams and Rockwell teaches these steps for transition data only, however, and not for a sub-set of transition data (i.e. start-up data) that is controlled by the program and compared to expected historical data.

Gaubatz teaches an automatic self-testing and diagnostic system comprising discriminating against failed sensors by automatically entering a predetermined state when failures are detected through a comparison between current data and theoretical data (column 2, line 59 to column 3, line 2), measuring current start-up data, and comparing the measured start-up data to a predetermined set of reference data stored in the device software instructions (column 5, line 61 to column 6, line 2).

It would have been obvious to one having ordinary skill in the art to modify the invention of Williams and Rockwell to include performing the aforementioned analysis for a program-controlled sub-set of transition data (i.e. start-up data), rather than only transition data, as taught by Gaubatz, because, as suggested by Gaubatz, the combination would have provided safe and proper operation of the machinery by insuring that the crucial initial conditions of the machining process are met (column 6, lines 2-5 and 33-37).

7. Claims 52 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams in view of Rockwell and further in view of U.S. Patent No. 5,319,353 to Ohnishi et al.

As noted above, the invention of Williams and Rockwell teaches all the features of the claimed invention except for displaying the operational status of the machine using a color-coded stack light.

Ohnishi teaches a method of monitoring a test handing machine which is capable of displaying the occurrence, and position, of an error or other inadequacy (column 3, line 67 to column 4, line 5) using a display panel (column 4, lines 15-24) as well as a color-coded stack alarm light, attached to the housing of the machine, that displays the operational status of the machine (column 7, line 64 to column 8, line 2, and "45" in Figure 3).

It would have been obvious to one having ordinary skill in the art to modify the invention of Williams and Rockwell to include displaying the operational status of the machine using a color-coded stack light, as taught by Ohnishi, because the combination would have provided a fast, convenient method for instantly determining the occurrence of a fault.

Allowable Subject Matter

8. Claims 29 and 32-39 are considered allowable over the prior art because while the invention of Rockwell Software, "RSRules" does teach a reaction-time diagram of run-time data indicating the time-on of a current transition and a time to off of a current transition with respect to a tolerance level based on

historical transition data, for each of a plurality of digital channels individually, none of the cited prior art teaches or suggests specifically a viewing component displaying a sequence diagram of a historical pattern of transition data defined by a first average, as defined by equation 2 of the specification, transition time to on, a second average transition time to off, and a duration time of each of a plurality of channels on an individual bases and a sequence diagram of current transition data.

Response to Arguments

9. Applicant's arguments filed October 04, 2004, have been fully considered but they are not persuasive.

Applicant first argues that "combining the teachings of Rockwell with Williams would change the principle operation of Williams. Specifically, combining the teaching of Rockwell to designate channels as visible or not visible to enable specialized analysis of channels specific to a particular operation or machine, would nullify the use of the potential fault library used by Williams. . . As can be seen, Williams utilizes a pre-established fault library to perform its fault analysis. In other words, within Williams, the decision on whether or not to analyze (include or ignore) a digital channel is not made by designating a channel to be ignored but rather is made by which potential faults are placed in the library, e.g., if it is desired to analyze a specific digital channel then a fault related to that digital channel is pre-placed within the library, however, if it is desired to ignore a specific digital channel then no

faults relating to that digital channel are placed in the library. If Williams were to use the teaching of Rockwell to designate a specific digital channel as included or ignored there would be no need for the potential fault library of Williams and without the potential fault library Williams would have no method or process for determining when a fault occurred."

The Examiner asserts the invention of Williams describes a fault library of states corresponding to faults that occur, specifically, "the preventative maintenance device 10 stores, to its library, the states of faults encountered as indicated by block 92" (column 5, lines 31-33). Therefore, when the preventative maintenance device encounters a particular state, it is compared to the fault library to determine if a fault has occurred as well as details regarding the fault (column 2, lines 25-29, "The computer can also maintain a library of states of the machine for fault conditions. Upon detecting a fault condition, the display device displays potential failure points using the library").

The proposed modification to Williams of including at least one channel designated to be ignored would not destroy the operation of Williams because the library would still be used to determine whether the information obtained from the desired channels (i.e. the channels not ignored) meet one of the fault conditions stored in the library. Further, it would have been obvious to one having ordinary skill in the art to include such a modification because, as suggested by Rockwell, the combination would have provided specialized analysis of channels specific to a particular operation (page 19,

"Understanding I/O groupings" and page 20, lines 1-3) thereby providing the user with more detailed information regarding the processing and performance of individual operations and further, by selectively ignoring/making not visible the output of particular channels for the global analysis of the entire machine, the combination would have provided the user with an option to link a plurality of operations together for an overall analysis or ignore individual aspects of a particular operation to provide specific user controlled analysis (page 20, lines 16-27).

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

U.S. Patent No. 6,226,762 to Foote et al. teaches a system and method for providing delayed start-up of an activity monitor in a distributed I/O system comprising an I/O module that specifies a plurality of channel lines that are ignored.

U.S. Patent No. 4,964,065 to Hicks et al. teaches a computer-controlled electronic system monitor comprising a plurality of analog input channels each designated by a corresponding type including a type "0" denoting that the inputs from the channel will be ignored.

U.S. Patent No. 5,923,903 to Alvarez-Escurra et al. teaches a programmable logic controller input-output system including a plurality of channels characterized by several job functions.

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (703)308-1309. The examiner can normally be reached on Monday through Friday, 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (703)308-1677. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7382 for regular communications and (703)308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

jrw
January 6, 2005